

**EXTENSION SERVICES AND AGRICULTURAL CROP PRODUCTION IN  
GICUMBI DISTRICT OF NORTHERN PROVINCE OF RWANDA**

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A Thesis

Submitted to the School Of

Postgraduate Studies and Research

Kampala International University, Uganda

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In Partial Fulfillment of the Requirements for the Degree Of  
Master of Business Administration

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By

Sebagenzi Prosper

MBA/10026/81/DF

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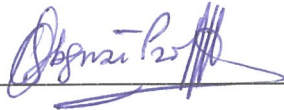
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## DECLARATION A

I SEBAGENZI Prosper, Registration Number MBA/10026/81/DF, hereby declare that this research is my own original work. It is not a duplication of similarly published work of any scholar for academic purpose, nor has it been submitted to any other institution of higher learning for the award of a degree. I also declare that all materials cited in this paper which are not my own have been duly acknowledged in references at the back of this thesis.

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SEBAGENZI Prosper

Researcher

Date: \_\_\_\_\_

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## DECLARATION B

I confirm that the work reported in this Thesis was carried out by the candidate under my supervision.

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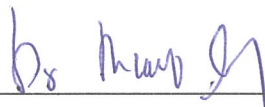
Mr. Kibuuka Muhammad

Supervisor

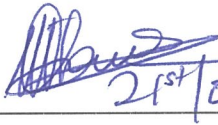
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## APPROVAL SHEET

This Thesis entitled "**Extension Services and Agricultural Crop Production in Gicumbi District of Northern Province Rwanda**" prepared and submitted by **Sebagenzi Prosper** in partial fulfillment of the requirements for the degree of **Master of Business Administration** has been examined and approved by the panel on oral examination with a grade of PASSED.



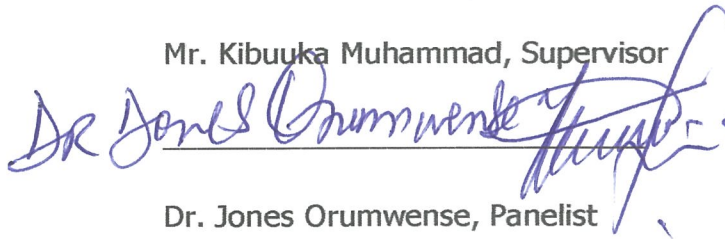
Dr. Manuel O. Sumil, Chairman

  
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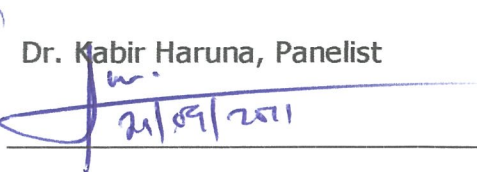
Mr. Kibuuka Muhammad, Supervisor



Dr. Kabir Haruna, Panelist



Dr. Jones Orumwense, Panelist

  
21/05/2011

Dr. Yahya Ibrahim, Panelist

Date of comprehensive Examination: 14/05/ 2011

Grade:

\_\_\_\_\_  
\_\_\_\_\_

Name and Signature of Director, SPGSR

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Name and Signature of DVC, SPGSR



## **DEDICATION**

I dedicate this thesis to my wife MUJAWAMAHORO Béatrice and our children GIHOZO Aimée Sandrine, IZERE Aimée Doreen and INEZA Aimé Brian for their love, encouragement and joy for my family.

## **ACKNOWLEDGEMENT**

Glory to the Lord our Savior who he is strength, power and knowledge for all people in this world, he who makes everything happen in a pleasant way.

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May friends, classmates and any other persons who contributed to the success of this research find our sincere gratitude.

## **ABSTRACT**

This research dealt with the Extension Services and agricultural crop production in Gicumbi district of Northern Province of Rwanda. The main research objective was to assess the effectiveness of extension services on Rwandan farmers' crop production and the unique null hypothesis was that there is no significant relationship within Extension Services and crop production of farmers in Rwanda.

The research design was Descriptive Design through a survey from 120 farmers (60 females and 60 males) drawn out of 6 Cooperatives namely Dufitubushake, Icyerekezo, Impuyaki, Kojyaki, Kundisuka and Rwanyubukene, respectively from Cyumba, Rukomo, Kaniga, Byumba, Miyove and Nyankenke Sectors.

Respondents were selected at random using probability sampling and simple stratified random sampling was used to get an equal representation of men and women among surveyed farmers. Quantitative and qualitative data were gathered through questionnaire type closed-ended questions for farmers and open-ended questions to guide focus group discussions with extension service agents at sector level.

Means of different variables (dependent and independent) computed using Excel showed weaknesses or gaps in all cases with some strength. On trainings methodology, results showed a very deep gap in area of using FFS approach. Training materials were also a challenge where farmers cannot access soil protection and fertility materials, pest control materials. In addition, farmers do not access inputs such as tools, fertilizers and agricultural loans.

Extension services have achieved adequate satisfaction in training on crop rotation, organic fertilizers, agro forestry and soil fixing plants. Gaps were recorded in the area of improved seeds, radical terraces, mulching and chemical fertilizers.

Looking at the production side, quantity and quality have improved in the last 5 years respectively very adequately and adequately but there is a serious gap on storage and export of agricultural production. Pearson's correlation has helped in making decision on null hypothesis. Extension services to farmers have significant relationship on crop production apart from methodology used and this happened due to the fact that the approach farmer field school was not applied in the area of research. Pearson product-moment correlation index have also shown positive direction relationship between extension services and crop production (quantitative and qualitative) and this has been confirmed by all extension agents in the area of research.

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## ACRONYMS

<b>ANOVA:</b>	Analysis of Variance;
<b>CTA:</b>	Centre Technique de Coopération Agricole et Rurale ACP-UE;
<b>FFS:</b>	Farmer Field School;
<b>INADES:</b>	Institut Africain pour le Développement Economique et Social- Centre Africain de Formation;
<b>ISAE:</b>	High Institute of Agriculture;
<b>ISAR:</b>	Institut des Sciences Agronomiques au Rwanda;
<b>MINAGRI:</b>	Ministry of Agriculture and Animal Resources;
<b>NUR:</b>	National University of Rwanda;
<b>PASNVA:</b>	Projet d'Appui au Système National de Vulgarisation Agricole;
<b>RADA:</b>	Rwanda Agricultural Development Authority;
<b>RARDA:</b>	Rwanda Animal Resources Development Authority;
<b>RHODA:</b>	Rwanda Horticulture Development Authority;
<b>SPSS:</b>	Statistical Package for Social Sciences;
<b>LDCs:</b>	Less Developed Countries;
<b>NISR:</b>	National Institute of Statistics of Rwanda
<b>ISAE:</b>	Institute for Agriculture and Animal Husbandry

## **CHAPTER ONE**

### **Background of the Study**

Rwanda is a small Country (26,338 km<sup>2</sup>) of thousand hills with high slop, with only 46 percent cultivable land (MINAGRI, 2009). In a bid to increase the yield and make it possible to exploit on the long run the small land at the disposal of Rwandan farmers, the Country has adopted the use of improved agricultural techniques throughout agricultural extension services.

The agricultural production is not sufficient to nourish a growing population of more than 10 million and it represents 41 percent of GDP, NISR (2005). Most farmers continue using traditional methods for farming though extension services have been used so long time to help farmers access improved techniques and this is thought to be the cause of low production of Rwandan farmers to produce for their families and markets, be it local or international.

Agricultural extension is known as the application of scientific research and new knowledge to agricultural practices through farmers' education. The field of extension now encompasses a wider range of communication and learning activities organized for rural people by professionals from different disciplines, including agriculture, agricultural marketing, health, and business studies.

Before colonization, there were no agricultural extension services in Rwanda and technical services were related to social interactions by exchange of information and goods. During the colonial period, the agricultural extension services aimed mainly at introduction of export crops such as coffee, tea, pyrethrum and quinquina. It was a directive system of extension (Top down Extension) where farmers were obliged to blindly fill standards defined by the colonial services. The system was characterized by an absence of dialogue between farmers and extension workers who were very inefficient at that period. Later on, sweet potato and cassava as crops to ensure food security were introduced.

During 1962 to 1980 period, a large number of public extension workers were recruited and stationed throughout the country at national, Provincial and sector level. Several extension approaches were tested such as extension through contact farmers, pilot zones, demonstrations in public fields, extension through farmers settled in non occupied lands (paysannats) etc.

In 1982, the first national extension system was officially launched. It included two important orientations which are development of partnership with farmers and collaboration in extension service delivery between extension workers and local authorities.

This system was replaced by the «Training and Visits » system, defined by the Workshop held in 1986 on the theme « Projects Reorientation ». In 1990, this extension system was extended to 8 Provinces out of 10 with the support of the « Projet Services Agricoles ».

From 1994 to 1998, it was the emergency period when Government efforts were oriented to rehabilitation of infrastructures and reconstruction of the country. During this period, many farmers associations were created mainly to benefit from assistance of NGOs and not to share their efforts and capacities to solve common problems. This contributed to instability of farmers groups and/or farmers associations, still experienced today, whereby these associations are not real partners of extension workers, in respect of delivering agricultural extension services (Hakizimana, 2007). None of the approaches introduced up to now took sufficiently into account the real needs of the farmers, because these approaches were designed and introduced by people who did not understand well the social-economic conditions of beneficiaries.

Thus appeared the need for reformulating principles, objectives and modes of intervention for a new extension system which was adopted by the « Séminaire National de Vulgarisation» in 1998. Recommendations issued from this workshop have not been applied. It is also in 1998 that extension workers (monagris) at sector level were removed from public service and this led to a distortion of the extension service

delivery, because there was no longer a link between MINAGRI and the farmers (Hakizimana, 2007).

From 1980 up to 1994, the pressure on land due to the high rate of population growth resulted in the decrease of soil fertility and the subsequent regression in food production. The extension system was still dominated by the State through the usual command chain from top to the bottom of the hierarchy. However, new extension approaches were tested through agricultural development projects. The participatory approach consisting in consultation between the extension officers and farmers was introduced.

Since 2004-2005, the agricultural extension function shifted from the Ministry of Agriculture and Animal Resources to the local administration entities. In that way, a given district does the recruitment and supervises the performance of the extension staff. The reports on farmer performance and problems are reported to the district which also reports to the Province and finally to the Ministry of Local Administration.

The agricultural extension framework in the case of India was so long timer as follow: The village extension worker (VEW) is the base level extension worker who teaches production recommendations to the farmers and the responsibility of all other extension staff is ultimately to make VEW more effective in his work. A VEW circle comprise 800 to 1000 actual farm families, divided into 8 groups of about equal size of farmers led by a contact farmer each one.

The agricultural extension officer (AEO) role is to review and assist in the organization aspects of the job of VEW, in particular to see that production recommendations are effectively taught to farmers and that field problems encountered by VEW and which he himself cannot resolve are passed on immediately to appropriate authorities. The sub-divisional extension officer (SDEO) has about 6 to 8 AEOs in his/her sub division and supervises AEOs and VEW in his/her area. SDEO has a team of at least three Subject Matter Specialists (SMS) in agronomy, plant protection and training. Above SDEO, there is zonal extension officer (ZEO) responsible for smooth extension of all extension activities in the districts and zone. S/he undertakes field

supervision to ensure farmers access adequate information and that farmers are provided with good advice and adopt extension recommendations.

At the state level there is a Director of Extension Services whose main responsibility is to see effective operation of extension systems throughout the state. He may have a team of SMSs. With this organizational set up, India has done more than merely increasing the production of agricultural output (Singh, 2008).

In the context of Rwanda, the extension agents are not sufficient to satisfy the farmers demand. It is estimated that there are a total of ten thousand farmers to one extension agent who is under the responsibility of the local administration (Hakizimana, 2007). It is also observed that most field officers may not have the necessary competence to deliver services. At the same time, the capacity to monitor them by the local authorities is equally limited.

The new approach to extension is based on decentralized structures, with extension Officer at District level and another one at Sector level. These technicians are supported from RADA (Rwanda Agricultural Development Authority), RARDA (Rwanda Animal Resources Development Authority) and RHODA (Rwanda Horticulture Development Authority), Research Institute (ISAR), High Institute of Agriculture (ISAE) and Faculty of Agriculture of National University of Rwanda (NUR).

Other main actors in agricultural extension structures that intervene at farmer's level are nongovernmental organizations, private investors and farmers' cooperatives and unions (Caritas Rwanda, IMBARAGA and INGABO Syndicates). Those organizations use graduates staff and mostly technicians with diploma in agriculture, trained technicians that hold certificates in agriculture and contact farmers that are trained on new agricultural technologies.

MINAGRI has recently proposed a new structure to the agricultural extension services, ranging from the village to the national level similar to the extension structure so long time applied in India (PASNVA, 2009).

A kind of approach combining agricultural credit, extension services and cooperatives (of credit, commercialization and supply) in implementation of rural development programs has given excellent results in Brazil, India, Mexico (FAO, 1964). Most developing countries use static credit instead of dynamic credits, and at the end there is no improvement of farmer's assets, revenue and production capacity.

### **Statement of the Problem**

Rwandans' agricultural production is still at subsistence level though techniques are designed to increase crop production (qualitative and quantitative) and tremendous efforts made through extension services to pass on farmers skills. Extension services have been used for long time in agriculture, since the colonial period till now to increase production to nourish a population of 10 million Rwandans, but what farmers have been taught so long time is not practiced in their field at efficient level. The Government of Rwanda has adopted different approaches from top-down approach to participatory approach, to ameliorate the understanding and in order to get the complete commitment of farmers in adopting improved techniques that are appropriate to increase production. Other strategies have been thought over like Girinka in a bid to access to manure, Crop Intensification Program (CIP) designed to improve the use of quality seeds, fertilizers etc. According to the development plan of Gicumbi District (2008-2012), there is a problem of high soil erosion, low use of inputs and low quantities of improved seeds used.

Challenges that Rwandan agriculture faces are many among them the severity of diseases which cause losses to the production in plots and stored grains; the poor land use and poor soil management which result in erosion and soil loss and poor productivity; the lack of value addition to the production by the lack of processing skills and facilities; the low use of improved seed, fertilizers and pesticides which determine very low yield; the lack of credits and loans facilities to finance the needed investments in agriculture sector and the low number of skilled people capable of disseminating knowledge and capacity building through proper extension work.

All these problems would not be there given the efforts that have been made since long time ago.

### **Purpose of the study**

The aim to this study is to contribute scientific analysis why extension services are not adopted at sufficient rate, given that more efforts have been deployed years ago. This research intends to help decision makers in the Ministry of Agriculture and Animal Resources of Rwanda and extension services implementers to guide them on how to improve the practices that will enhance the services to the entire community in order to achieve quantitative and qualitative crop production for home use and export.

### **Research Objective**

The general objective is to assess the effectiveness of extension services on Rwandan farmers' crop production.

The specific objectives of this research are:

1. To determine the profiles of farmers in terms of age, gender, education background and length of experience in crop production;
2. To determine the level of effectiveness of extension services on crop production;
3. To determine the level of crop production among farmers in Rwanda;
4. To determine if there is a significant relationship between extension services and crop production among farmers in Rwanda;
5. To suggest ideas and strategies to further enhance crop production of farmers in Rwanda based on the findings of the study;

### **Research Questions**

The questions to this research are:

1. Do Extension Services work effectively on Crop Production?

2. Does the Crop Production differ from Rwandan Farmers?
3. Is the Relationship between Extension Services and Crop Production Significant among Rwandan farmers?

### **Hypothesis**

To this research only one null hypothesis was formulated as follow:

There is no Significant Relationship within Extension Services and Crop Production of Farmers in Rwanda.

### **Scope of the study**

#### ***Geographical Scope***

This research was carried out in Northern Province of Rwanda, Gicumbi district, in six Cooperatives: Dufitubushake, Icyerekezo, Impuyaki, Kojyaki, Kundisuka and Rwanyubukene, respectively of Cyumba, Rukomo, Kaniga, Byumba, Miyove and Nyankenke Sectors.

#### ***Theoretical Scope***

This research is limited to agricultural extension services in the domain of crop production, looking at the best practices by extension services among farmers such as bench terraces-progressive terraces, crop rotation, mulching, improved seeds, mineral fertilizers, manure, extension curricula and agricultural credit. In addition, this research has a look at the crop production vis à vis extension services.

#### ***Content Scope***

This research has mainly one dependant variable that is crop production (in terms of quality and quantity) and one independent variable which is extension services including extension methodology, training materials, inputs (improved seeds, credits, fertilizers) etc.



### ***Time Scope***

This research covers the period since extension services started being implemented by the Government of Rwanda in 80s-90s to date (MINAGRI, 2002).

### **Significance of the study**

The beneficiaries of the study are all Rwandan farmers, particularly those from Gicumbi District of Northern Province of Rwanda. The actual population of Rwanda is 10 million and about 87 percent of active people are farmers (RADA, 2005).

Government of Rwanda as a strategic formulation entity will use results of this research in carrying out activities in agricultural extension services.

Different partners such as NGOs (local and international) and private sectors will base on findings of this research in order to speed up and make more effective and efficient their interventions.

In general, all Rwandans will benefit through food security assured and as Rwanda economic growth relies on the agriculture domain, the Country wealth as a whole will be increased as well.

### **Operational Definitions of Key Terms**

***Agricultural extension:*** The application of scientific research and new knowledge to agricultural practices through farmer education using communication and learning activities organized for rural people by MINAGRI, NGOs and extension workers in agricultural area.

***Farmer Field Schools (FFS):*** The extension approach based on the methodology of long-season training and whose main focus is promoting learning by discovery (learning by doing).

***Mulching:*** Protective cover of grasses placed over the soil to retain moisture, reduce erosion, provide nutrients and suppress weed growth and seed germination.

***Improved seeds:*** Seeds that are drought resistant, diseases resistant and have very high yields.

***Crop rotation:*** Cultural strategy , which is a planned order of specific crops planted on the same field where a succeeding crop belongs to a different family than the previous one.

***Extension Services:*** This is a kind of education which is stretched out to the people in far rural areas through trainings, demonstrations in the field, exchange visits etc. Agricultural extension services are referred to as spreading the useful and practical knowledge about agriculture to those who are engaged in agricultural (most rural community members) activities changing their traditional behavior into the adoption of new methods of farming to produce surplus for meeting diverse needs of the increasing human numbers.

***Crop Production:*** It is a complex business putting into action many skills such as biology, agronomy, marketing and mechanics to produce qualitative and quantitative food to achieve food security.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### Concepts, Ideas, Options from Authors/Expert

From the variables of this research, different concepts and ideas from Authors/Experts are as below.

***Agricultural Extension:*** According to Leeuwis (2004) extension is a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve (usually multi-actor) problematic situation. Agricultural extension is referred to as education effort to increase agricultural production and natural resources protection by adoption of improved techniques, improving shelter, hygiene and socio-economic conditions in rural areas (FAO, 1964). When the extension and agricultural credit work together, the farmers are receptive to extension messages and even ready to adopt what they have learnt.

***Farmer based extension:*** experience of Rural Sector Support Project (RSSP). Theoretical and practical trainings are provided to groups of 20 to 25 farmers, and at the end of the training cycle, trained farmers become lead farmers who each of them organize new groups to be trained. Approach used by the NGO Caritas Rwanda: in a *participatory approach*, Caritas through poor households in areas with frequent food insecurity crises, links groups of farmers or individuals to Micro Finance Institution called «*Réseau Interdiocésain de Microfinance*» to promote income generating activities and to encourage them to constitute strategic stocks for food security, PASNVA (2009).

***Voluntary based extension:*** experiences of Syndicat Ingabo that has initiated a system of voluntary farmers, providing agricultural extension services to their colleagues. Motivations for those farmers are trainings, study tours, and awards received in agricultural competitions. Each voluntary extension service providers accepts to assist at least 5 exploitations in their own neighborhoods.

***Commodity Chain Development Approach:*** being used by different development partners. It deals with promoting one speculation from inputs supply to the marketing of the final processed product. The advantage of this approach is that it tends to organize the producers in Unions and Federations, which, in long term, can be able to replace public extension services for certain tasks within their specific commodity chain.

Emphasis has been made to four priority crops namely maize, rice, Irish potato and wheat, and later on this has been expended to cassava, beans, soybeans and peas. There is also a problem of fertilizers. By 2020, the projection is to reach a target of 15 kg of fertilizers per Ha (IFDC, 2010). For the crops priority in regard to imported fertilizers, only 66 kg of fertilizer would be applied per hectare and per season, while the fertilizer recommendations for the crops selected range from 100 kg to 300 kg/per ha/season (IFDC, 2009).

In regard to seed distribution, it is estimated that CIP (Crop Intensification Program) efforts to meet seed needs varied from a high of 74 percent (maize), 55 percent (cassava), 38 percent (wheat), to only 0.95 percent (beans) and 0.20 percent (potatoes) (IFDC, 2009). While the progress made to provide maize, wheat and cassava seeds, was significant, beans and potato seed distribution was very minimal.

The other challenge remains that Rwanda is a hilly and a rainy country while measures that have been taken to control erosion are not put into practices. It is estimated that 23 percent have no risk of erosion, 38 percent have to be protected from erosion before cultivation and 39 percent have high risk of erosion. Because of lack of soil erosion control, there is loss of up to 1.4 million tons of fertile soil to other countries along the river basins each year. In the vision 2020, the Government of Rwanda (GoR) plans to have 90 percent of lands under control erosion through involvement of farmers in the planning and the implementation of erosion control strategies, by use of mulching, under cropping, cultivation of soil fixing species on

erosion control lines, practice progressive and radical terraces, agro forestry, alley cropping etc.

To ensure the use of fertilizer, improved seed and other agricultural improved techniques, capacity building of farmers is critical and this is done by nine extension service providers who assign a proximity extension agent to every 500 ha in land use consolidated areas. The service providers need specific training in integrated soil fertility management (ISFM) and institutional capacity building in general.

***Farmer Field School (FFS):*** Is a learning by doing approach applied to agriculture and emerged in Indonesia in 1980s to address the problem of lack of knowledge among Asian farmers relating to agro ecology, particularly the relationship between insect pests and beneficial insects (Ortiz, 2004). It is a group-based learning process that has been used by a number of governments, NGOs and international agencies to promote Integrated Pest Management (IPM) (Feder, Murgai & Quizon, 2004). The Farmer Field School brings together concepts and methods from agro ecology, experiential education and community development.

***Participatory technology development (PTD):*** approach to learning and innovation that is used in international development as part of projects and programs relating to sustainable agriculture (Stoll, 2008). The approach involves collaboration between researchers and farmers in the analysis of agricultural problems and testing of alternative farming practices. Institute for Low External Input Agriculture (ILEIA) based in the Netherlands described PTD as "a process between local communities and outside facilitators which involves: gaining a joint understanding of the main characteristics and changes of that particular agro-ecological system; defining priority problems; experimenting locally with a variety of options derived both from indigenous knowledge and from formal science, and enhancing farmer's experimental capacities and farmer-to-farmer communication.

***Improved Seeds:*** Referred to as seeds that have been tested and proved the capacity to provide high yield and resist against diseases (MINAGRI, 2009). The use of improved seeds remains a challenge in Rwanda. According to MINAGRI, 2002 the use of improved seed is limited to very few farmers and too few crops are concerned. Only farmers who can afford the cost of improved seed use them and it is estimated that 1 percent of the total seeds are certified and can provide substantial yield. This is also the same for pesticides that are used for export crops mainly coffee and tea.

***Crop Production:*** It is a complex science combining biology, agronomy, marketing and mechanics to produce qualitative and quantitative food to achieve food security (Singh, 2008).

***Extension systems:*** According to Frank (2001) defines extension system as Educational Institutional Extension System; General Agricultural Extension System; Commodity Specialized Extension system, Non-governmental Organization Extension System and Parastatal-based Extension System.

## **Theoretical Perspectives**

According to Kelly et al (2001) farmers indicate that lack of knowledge is the principal reason for not using fertilizers to enhance productivity. Farmer organizations and NGOs are increasingly responsible for providing extension services but with short project cycles and little institutional capacity may be built for the long term. Project-based extension initiatives should build training of permanent extension counterparts into their activities. This is related to this study as it has been noticed in Rwanda in 2011 proved by a group of researches on agricultural intensification in Rwanda, looking more specifically at fertilizer use.

According to RADA, 2005 the extension services present potentials and opportunities for development but there are a number of challenges that must be contained in order to achieve the vision of the sector. The challenges range from the characteristics of the land to the management of production and harvest management.

With most of the land being hilly, the first challenge lies in controlling erosion which is currently estimated to cause a loss of up to 1.4 million tons of fertile soils to other countries.

The human aspect also imposes yet another challenge. With the majority of illiterate farmers, innovation in agriculture is rather slow and most farmers are stuck to their old farming practices. There is need to address the technology transfer challenge to ensure that farmers utilize appropriate technologies and practices that can ensure proper yield of the crop.

According to Singh, 2008, the extension education is based on different principles. The principle of interests and needs stipulates that extension work must begin with the interests and needs of people, not those of extension worker as it is in most cases. The principle of grass root organization must be observed and it states that things must spread from below and spread like grass, concentrating on local groups, local situations and local problems. The principle of participation must be developed and the extension worker must be aware that good extension work helps rural people identifying their problems and then helping them in solving these problems. Participation of people in form of kind or labor develops a sense of their belonging towards the project.

In extension work, farmers should be encouraged to learn new things by doing and by direct participation. According to Singh (2008), farmers like other people, hesitate to believe and set on theories, or even facts, until they see with their own eyes the proof of them in material form. We must, in some ways, bring this work to their personal attention. We must carry it home to them. Even if this has been carried out in Indonesia, it is relevant to our study as we talk about training methodologies and approach.

There are different people in the village and differ in their level of understanding and knowledge and therefore, only one extension method cannot be of use in providing information to all. That is why research shows that the use of more than one method (written materials, Radio programs, meetings, demonstrations) carries the message

effectively to the people and this is the *principle of adaptability*. For good extension work, voluntary leaders should be identified, trained and encouraged to do extension work and this is the *principle of leadership* that must be observed. If something intended to be infused for long term purpose is to be taught, it should be taught to the whole of family as all members of the family have to be developed equally by involving all of them and this is the *principle of whole family training*. There should be a *principle of satisfaction* of all participants and *evaluation principle* whereby progress is measured for making adjustments.

Looking at systemic perspective, agricultural system has six functional components: *production, supply and credit, marketing, research, extension and regulation*. The scope of extension work in rural areas is indicated under nine areas: increasing efficiency in agriculture production; increasing efficiency in the marketing, distribution and utilization of agricultural inputs and outputs; conservation, development and use of natural resources; proper management on the farm and in the home; better family living; youth development; leadership development; community development and rural development and improving public affairs for all-round development.

Other things remaining constant, the progress of production in agriculture may be thought of as proportional to the strength of extension service of the relevant Government departments (Singh, 2008).

Extension workers at any level do not handle any inputs (seeds, pest and disease control materials, credit, fertilizers etc) and are not responsible for their distribution or sale. However, the extension has an important role in advising input agencies of the input supply situation in the field and anticipates demand. Farmers should not be advised of production recommendations involving inputs unless those inputs are available to them and this can be achieved by involving inputs agencies in pre-seasonal, monthly and fortnightly extension planning and training meetings (Daniel & Michael 1984). Fertilizer is the kingpin for increasing productivity in agriculture. According to the same author, for every tone of fertilizer nutrient put into the soil there is an increase of



8 to 10 tons of food grains, other things remaining equal. It has been estimated that about 70 percent of growth in agricultural production can be attributed to increased fertilizer use. To mitigate the increasing cost of chemical fertilizers, and satisfy the increasing demand of fertilizers, Governments emphasis on integrated nutrients supply through conjunctive use of fertilizers organic manure and bio fertilizers (Rhizobium), cheap and renewable source to supplement fertilizers.

Women have an important role in agriculture. Many women are solely responsible for the operation and management of a farm. Women often have an active role in the storage and processing of farm products and, in some areas, in land preparation and they have sole care for kitchen gardens and for that must be fully involved in extension services by putting in place some women extension workers.

The methods used to deliver extension messages to farmers are so many. The individual method used when people to be contacted are few, close to each other and there is enough time. It includes farm and home visits, office calls, personal letter, adaptive or minikit by trial first of all at farmer level before spreading it out to other farmers and it take a long time and energy of extension worker and satisfactory results may not be obtained if the practices of the farmers are not carefully chosen.

The group method is considered as an aggregate of small number of people in reciprocal communication and interaction around some common interest. In this method extension worker communicates with the people in the groups and not as individual persons. Examples are results demonstrations, method demonstration, study tour, field day or field visit etc.

The mass method is used when communicator has to communicate with mass of people without taking into consideration their individual or group identity. The method is followed where large and widely dispersed audience is to be communicated within short time. There is lack of interaction and little control by the extension worker over the responses of the audience and getting feedback information and evaluation of

results is difficult. They include farm publications, mass meetings, campaign, exhibition, newspapers, Radio and TV. The modern way which uses internet is not accessible to farmers and seems to be costly (CTA, 2002).

According to FAO (1964) finance is the most basic of all requirements, because in the absence of finances no development project can really come to fruition. In the experience of India, cooperative credit societies are the best source of rural credit with low rate of interest and this works obviously under the Government motivation. For the long term loans to farmers, there is a need for setting land development banks known as land mortgage banks with credits for 15 to 20 years.

### **Related Studies**

According to the study from Michigan State College (1941), farmers should be the first to ask for extension services, not the agent to think on their behalf and this has been used so long time ago in Michigan where demands were from rural population and then approved by county boards of supervisors.

According to William 2003, Less Developed Countries (LDCs) extension Institutions and Programs exist in every developed and developing country and yet, in the latter the coverage of farm families is still too limited.

In extension service the private sector plays an important role. Depending on the particular economic and political situation the private sector may consist of individual farmers/farm enterprise of all sizes, agricultural input industries, agro service enterprises, processing industries, marketing firms and multinational firms and / or their subsidiaries. It includes also a wide range of agricultural production and marketing Cooperatives, farmer Associations, private and voluntary organizations.

Public sector extension, private sector extension, non-government and parastatal-based organizations can all have a role in technology transfer within a single country (Frank & Brewer, 2001). All the above enterprises share a common market

orientation and have a strong incentive to deliver goods and services including agricultural extension efficiently and effectively.

The private sector extension does have a role in Third World agriculture and can be a supplement to government extension systems for certain groups of producers under certain conditions. A private sector can play a predominant extension role for particular inputs (commercial crop and commodities) and for particular farmer in particular geographic area but cannot substitute completely public agencies (William & Suzan, 2003).

The experience of private involvement we need to share is one from Guatemala and this is a model that would help if applied to our context. The ALCOSA (Alimentos Congelados Monte Bello, SA), is a company purchasing cauliflower and broccoli in 17 small highland villages, involving 2,000 small holder farmers. Farm production in each zone begins with a series of visits by the agronomists a month before the highland dry season comes to the end. In the meetings the agronomists identify farmers to produce cauliflower and broccoli for ALCOSA. Inputs are supplied such as seeds or transplantable seedlings, fertilizers and insecticides as interest-free loans against the harvest deliveries. The transport of products to processing plant is covered by ALCOSA. Over years of the project, effects have been: cultivation patterns have changed from diversification to concentration on the cash crop; use of production credit, previously non-existent in the village and now has become common practice. Investment in inputs has risen; technical knowledge and know-how have increased; farm income has increased and farmers have gathered into Cooperatives. If this was happening in LDCs, extension services would have been profitable for small holder farmers.

For extension to be effective the extension staff must be sound in technical as well as process skills to be able to develop credibility and rapport with clientele. Extension workers should understand farming on a system's perspective, not just specific technologies (Frank, 2001)

## **CHAPTER THREE**

### **METHODOLOGY**

#### **Research Design**

The design of this study is Descriptive Research Design meaning that we described what practices exist in current situation according to level of study, inputs, extension curricula, extension methodology and gender. For data analysis we used descriptive and correlation statistics.

#### **Research Population**

The population of this research is composed of members of all sampled Cooperatives from Gicumbi district. As reminder, Rwanda counts for 10 million of people and more than 88 percent of active people are farmers. The number of members from the six Cooperatives is 170. All members from these Cooperatives were eligible and the decision was based on randomization.

#### **Sample Size**

The population is 170 and according to the formula of sample determination from SLOVEN's, the sample to this research is 120 determined as follow:

$$S = \frac{P}{1 + P(0.05)^2} = \frac{170}{1 + 170(0.05)^2} = 119.2982 \cong 120$$

S is the sample size; P is the population and 0.05 the margin of error. The sample size of our research was 120 farmers, broken down into 60 females and 60 males who are members of 6 Cooperatives and have benefited from extension services in their agricultural activities.

#### **Sampling Procedure**

The sample was composed of farmers, females and males, drawn from Gicumbi farmers who are gathered into Cooperatives. Icyerekezo, Dufitubushake, Kojyaki,

Rwanyubukene, Kundisuka and Impuyaki Cooperatives from respectively Cyumba, Byumba, Nyankenke, Miyove and Kaniga Sectors were concerned in this research and chosen at random from the lists of Cooperatives of the Sector. Sixteen members of the Cooperatives were chosen also at random and at equal representation between male and female.

By using probability sampling, each person in the population had an equal chance of being selected. People to be surveyed were selected at random, using random numbers. Gender creates a subgroup that can influence results and that is why we used simple stratified random sampling to get an equal representation of men and women.

### **Research Instruments**

Research devised questionnaire and interview guide were used. The questionnaire was composed of questions of three categories according to different objectives of this research: questions to gather information on farmers profile, questions to gather information on the level of effectiveness of extension services on crop production and finally questions designed to gather the information on the level of crop production among farmers. The interview guide for sector level extension agents was composed of mainly three questions on the knowledge of farmers, the contribution of extension services on crop production and finally the extent to which the crop production has improved in the last five years.

### **Validity and Reliability of the Instrument**

According to validity, views and ideas were sought from key persons in the domain of extension from MINAGRI and extension workers, expert of crop production and lecturers. According to them over 80 percent of questions were valid. The questionnaire reliability was examined through pre-test, testing it first of all to 3 persons different from those to be surveyed but similar in agricultural domain then tested again to another group of 3 farmers the following day and results compared were highly correlated (over 0.93), meaning that the questionnaire was reliable. According to Tibbits, 2009 valid survey is

always reliable but reliable one is not always valid and that is why we have made it valid first of all.

### **Data Gathering Procedures**

First and foremost we have designed questionnaires and interview guide, tested them for validity and reliability. After they were tested, we distributed them to Cooperatives' members and helped those who are illiterate to fill them. After data were collected, we gathered them into excel sheet and we calculated percentages of extension services adoption among surveyed farmers. The percentages calculated were then computed using SPSS to test whether the mean differences were significant. Farmers were chosen at random, and to complement quantitative data, the extension services agents were interviewed.

### **Data Analysis**

The survey was done by administrating questionnaires and interviewing Government Officials or extension service providers be it NGOs or local Organizations in the area. In addition, books, journals and Government reports especially those of Ministry of Agriculture and Animal Resources were searched. Quantitative questionnaires' questions were forced choices while open-ended ones were used for focus group discussion.

We ensured that the information gathered through questionnaires and interviews were precise and accurate. However, the definitions in questionnaires were grounded or established theory or experience. Before administration, we have done a pilot testing twice from a similar group to the one that was to be investigated for the research and results were highly correlated. As by administrating questionnaires for quantitative data collection we cannot get qualitative data information, the survey was complemented by qualitative data through focus group discussion (FGD), targeting Government agricultural extension service providers. Data were computed through SPSS to correlate variables and decide on how they impact on each other.

In order to interpret the data obtained from the respondents, the following values and interpretation were used.

Mean range	Interpretation
4.20-5.00	Very Adequate
3.40-4.20	Adequate
2.61-3.40	Moderately Adequate
1.81-2.60	Inadequate
1.00-1.80	Very Inadequate

### **Ethical Consideration**

This research was conducted in a way assuring that interviewee's rights to privacy and anonymity were observed. Only on the consent of participants, the survey and interview were conducted, and results are kept confidential and only are used for academic purpose.

### **Limitations**

The first limitation of this research is the literacy rate that is low among farmers. Questionnaires were not mailed but self-administrated and where need be, the respondents were guided in reading and recording answers. The second limitation is referred to as threat to validity whereby those asked for questionnaire validation, for their own interest or that of companies they work for may have misguided us. Limitation is also linked to questionnaire testing and data collection where some respondents provide false information. Other threats according to Emil (1997) are those actual but non program related changes in the participants like maturation and history; apparent changes dependant on who was observed like selection, attrition and regression and finally changes related to methods of obtaining observations like testing and instrumentation.

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We have tried to minimize these limitations looking at people who are credible and known for their integrity to validate questionnaire and we assured confidentiality to respondents.



## **CHAPTER FOUR**

### **PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA**

#### **Farmers Profile**

Some questions were asked to respondents to get information about their ages, level of education and their experience in agricultural domain. Ages were recorded according to intervals of 10 years each one and level of education using P for Primary and S for Secondary. All responses were recorded in excel and frequencies extracted and presented in a table as below.

**Table 1**

## Farmers Profile

<b>A profile of farmers</b>	<b>Frequency</b>	<b>Percent</b>
<b>Age</b>		
20-30	36	30.0
31-40	39	32.5
41-50	28	23.3
51-and above	17	14.2
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Gender</b>		
Male	60	50.0
Female	60	50.0
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Level of Education</b>		
Primary	73	60.8
Secondary	40	33.3
No study	7	5.8
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>How long farmers are involved in agriculture production</b>		
1-10	11	9.2
11-20	45	37.5
21-30	30	25.0
31-40	24	20.0
41and above	10	8.3
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>How long farmers benefited from extension services</b>		
1-10	80	66.7
11-20	36	30.0
20 and above	4	3.3
<b>Total</b>	<b>120</b>	<b>100.0</b>

**Source:** Primary data 2011

The profile table shows that most respondents (32.5 percent) are married people since the average age of marriage is between 21-35 years and these people try to perform and achieve high level of agricultural production to maintain their family members in good conditions. The most promising is that young people are also involved in agricultural production as at the second level (30 percent of respondents). The other point is that old people were less represented (14.2 percent) and as their strength, knowledge and ability to handle agricultural crop production get decreased, they leave

the work to be done by young generation and other strong people in age of high performance.

Gender issue was handled equally where respondents were equitably chosen among males and females (50-50 percent). Looking at education level of respondents, the majority of farmers have gone through primary education (60.8 percent) followed by those who attended secondary education (33.3 percent) and few people were illiterate (5.8 percent).

The involvement in agricultural crop production has taken a long time without benefiting from extension services as through the profile of farmers table they have been doing agriculture so many years but they have short period experience with extension services (from 1 year to above 41years in agricultural crop production vis-à-vis 1 year to above 20 years of extension services).

For the education level, 5.8 percent of illiterate is a big number and this constitute a barrier to agricultural extension services to be applied at regular basis in their farming, meaning that they need a methodology which is appropriate for illiterate people and for the farmer field school is appropriate.

### **Level of Effectiveness of Extension Services on Crop Production**

To assess the level of effectiveness of extension services on crop production, 19 questions were asked to all respondents. These questions were grouped into 4 categories, the first one on training methodology, the second one on types of trainings they benefited from, the third one on their access to extension service inputs and the last one their satisfaction in different trainings they benefited from so far. The questions were asked in away to allow farmers to chose from very inadequate, inadequate, medium, moderately adequate and very adequate, choosing number from one to five respectively. All responses were computed in excel and means calculated as in the table below.

***Level of Effectiveness of Extension Services on Crop Production:  
Training Methodology and Access to Training Materials***

To assess the training methodology among farmers, three questions were asked regarding which method was used in their trainings. For the access to training materials, four questions were asked and in both cases solutions were computed in excel for means calculation. The table below presents the results.

**Table2**

Level of Effectiveness of Extension Services on Crop Production: Training Methodology and Access to Training Materials

(n=120)

<b>Designation</b>	<b>Mean</b>	<b>Interpretati on</b>	<b>Rank</b>
<b>Training methodology</b>			
Training through group/cooperative	3.18	Moderately Adequate	1
Training through Farmer Field Schools (FFS)	2.22	Inadequate	2
Training through Farmer Field School and group/cooperative combined	1.71	Very Inadequate	3
<b>The average on training methodology</b>	<b>2.37</b>		
<b>Training Materials</b>			
Access to Crop Production Training Materials	2.88	Moderately Adequate	1
Access to Soil Protection Materials	2.53	Inadequate	2
Access to Soil Fertilization Materials	2.27	Inadequate	3
Access to Pest Control Materials	1.89	Very Inadequate	4
<b>The average on training materials</b>	<b>2.39</b>		

**Source:** Primary data 2011

In regards to farmers training methodology some work was done in gathering them into cooperatives with the mean of 3.18 but this is still below what should be achieved. For the training using farmer field school approach with the mean of 2.22, we can say that the achievement is fair but again far from reaching very adequate which is ideal and it needs to be kept up. Training farmers using both approaches (farmer field school and training in cooperatives) is very weak and constitutes a threat of high level. There is much work to do to address this critical gap in order to increase agricultural crop production in Rwanda.

For the access to training materials, the table above shows the access of farmers to crop production materials is fair with the mean of 2.88. We notice that farmers do not have access to training materials at sufficient level where only crop production materials access is moderately adequate still far from being very adequate as the ideal level. Compared to others, this sounds realistic as most farmers have some brochures on different crop production (beans, wheat, banana, pineapple, Irish potato, sweet potato etc). Weaknesses are so many in this area of access to training materials where soil fertilization materials access mean is 2.27, soil protection materials access mean is 2.53 and pest control training materials mean is 1.89. This is a very big threat as Rwanda loses each year 1.4 million tons of soil by erosion, which washes down hills soil nutrients, rendering it unproductive (Rada, 2005). The current situation of very inadequate access to pest control materials is also critical as farmers must be aware of existence of pests that damage crops in the field even after they are harvested during their storage. There is a lot of work to be done to address this situation to achieve extension services communication and skills transfer.

#### ***Level of Effectiveness of Extension Services on Crop Production: Access to Extension Services Inputs***

Four questions were asked in relation with seeds, fertilizers, loans and agricultural tools. Results were also computed by use of excel to calculate means and results are presented below.

**Table3**

Level of Effectiveness of Extension Services: Access to Extension Services inputs

n=120

<b>Extension Service inputs</b>	<b>Mean</b>	<b>Interpretation</b>	<b>Rank</b>
Access to agricultural seeds e.g beans	3.42	Moderately Adequate	1
Access to agricultural tools e.g plowing machine	2.49	Inadequate	2
Access to agricultural fertilizers.eg manure	2.44	Inadequate	3
Access loans. e.g. warrantage	1.56	Very Inadequate	4
<b>Average</b>	<b>2.48</b>	Inadequate	

**Source:** Primary data 2011

The market satisfaction in terms of seeds is moderately adequate with the mean of 3.42 meaning that at that level there is something done but still the Government of Rwanda needs to put into more efforts to get it up to very adequate satisfaction of the demand. According to MINAGRI, 2005 few people who can afford the high price of certified seeds access them and only it is estimated that only 1percent of seeds farmers use is certified and can give high yield and this is a big challenge in agricultural sector. What has been achieved may be linked to the fact that under crop intensification program (CIP) farmers get improved seeds and are asked to cultivate them under land use consolidation approach but more efforts need to be put into place to achieve very adequate access to seeds.

Agricultural tools (materials to prepare soil, to sow crops, harvest and process) are accessed fairly and the mean is 2.49 while the agricultural fertilizers (manure,

industrial fertilizers, and green fertilizers) are accessed with the mean of 2.44. The very critical point is on agricultural loans (credit for agricultural activities, warrantage system) with the mean of 1.56 and this remains a threat to the agricultural sector and needs to be addressed without delay if much progress through Government policies and strategy is to be achieved. According to Professor Karemangingo Charles, Rector of ISAE, fertilizers used in crop production is 30 percent of the standards quantity needed (summit on agriculture, 29<sup>th</sup> August, 2011, Radio Rwanda). Farmers do not access loans at all and it has been proved in the case of India that when farmers have a serious and collaborative credit system they increase their production and practice agriculture as a profit making business rather than a subsistence activity (Singh, A., 2008).

In the case of Rwanda, Caritas Rwanda works with the poorest of the poor in a bid to restore their dignity and has developed the kind of credit to small holder farmers through RIM, a Catholic Church Microfinance in Rwanda and the impact it has on the lives of those people tells more about the effectiveness of being linked to finance for farmers. In fact there is mutual support whereby RIM has put in place personnel to help farmers in designing bankable projects and help them in the implementation making sure there will be a win-win situation from both sides.

### ***Level of Effectiveness of Extension Services on Crop Production: Access to Trainings***

In total eight questions were asked to know the kind of trainings farmers received. Like in the previous questions, respondents had to choose from very inadequate to very adequate satisfaction. Responses were recorded and means calculated using excel as in the table 4 below.

**Table 4**

Level of Effectiveness of Extension Services on Crop Production: Access to Trainings

n=120

<b>Training services</b>	<b>Mean</b>	<b>Interpretation</b>	<b>Rank</b>
Training on crop rotation	4.16	Adequate	1
Training on organic fertilizers	3.89	Adequate	2
Training on agro forestry	3.53	Adequate	3
Training on cultivation of soil fixing plants	3.48	Adequate	4
Training on improved seeds	3.37	Moderately Adequate	5
Training on progressive and radical terraces	3.09	Moderately Adequate	6
Training on mulching	3.04	Moderately Adequate	7
Training on chemical fertilizers	1.95	Inadequate	8
<b>Average</b>	<b>3.31</b>	Moderately adequate	

**Source:** Primary data 2011

The satisfaction of farmers in terms of trainings they benefited from in crop rotation, organic fertilizers, agro forestry and soil fixing plant cultivation is adequate. Some work is done in that area but still there is need to keep it up until very adequate level is achieved. This may have happened in the area of crop rotation as the extension service agents, under request of the national level have set a certain number of crops that have to be in rotation all year long and all farmers are informed of next crop to be planted according to the actual one. Gaps remain in the area of trainings in use of improved seeds, training on progressive and radical terraces, training on mulching and



training on use of chemical fertilizers and the gap for the last one is very high with the mean of 1.95 very low compared to other trainings received.

There is a need for the farmers to be well trained in use of improved seeds, which is considered as an engine to increase yield and crop production in general. The improvement of training on progressive and radical terraces can reduce significantly tons of soil lost every year with preservation of its fertility. If mulching is taught well, farmers may reduce the speed of water evaporation, making it available to plants for the long period and also as grass used decay and form manure, the problem of soil fertility can be solved in sustainable manure.

The weakness in training on chemical fertilizers is crucial and needs to be taken care of in the Ministry of Agriculture and Animal Resources (MINAGRI). The gap is not only observed in terms of training farmers on chemical fertilizers but also in terms of access to them as stated in the table 3 above with the mean of 2.44 and as this comes again as a gap, this must create more attention to all extension service actors to make it higher to the level of very adequate.

### **The Level of Crop Production among Farmers**

To this objective, two categories of questions were asked: the first one regarding the increase in crop production with six questions and the second regarding the improvement in the quality of crop production with three questions.

#### ***Increase in Agricultural Crop Production in the last Five Years (2007-2011)***

Five questions were asked regarding general agriculture production, sales production, income from sales and finally production for home use. Responses were computed through excel and means are presented below.

**Table 5**

Increase in Agricultural Crop Production in the last Five Years (2007-2011)

N=120

<b>Increase in Agricultural crop production</b>	<b>Mean</b>	<b>Interpretation</b>	<b>Rank</b>
General agriculture crop production	4.31	Very Adequate	1
Sales production (home market)	3.96	Adequate	2
Income from sales of agricultural products	3.79	Adequate	3
Production for home use	3.66	Adequate	4
Production for store	3.29	Moderately Adequate	5
Production for export	1.56	Very Inadequate	6
<b>Average</b>	<b>3.43</b>	Adequate	

**Source:** Primary data 2011

The table 5 shows that among the indicators of crop production studied, the increase in general agricultural crop production has the highest mean: 4.31, corresponding to very adequate. This is a translation of improvement of agricultural crop production Rwanda has known in the previous years, recording the upward trend of growth rate from 3 percent to 6 percent (Nisir, 2008). Under an excellent achievement we have a challenge behind namely access of the production to the international market which has very low mean (1.56) which corresponds to very inadequate satisfaction. On the other hand, sales production at local market, production for home use and production for storage, which record the mean above the average, need to be improved from adequate to very adequate and all of them are challenges

agricultural crop production does face in Rwanda. In other words, according to the table 5, there is a work done under sales production at home market, income from agricultural products sales and production for home use where the increase from all of them had been adequate in the last five years. There is another long way to go to get them improved towards very adequate which is the ideal situation to produce enough food for home use and sales, home market, storage and foreign market (export).

***Improvement in Agricultural Crop Production in the last Five Years (2007-2011)***

Three questions were asked in terms of size or caliber of crop production, the taste and customer attractiveness and farmers had to choose from one to five respectively very inadequate to very adequate. All responses computed in excel have given results as below.

**Table6**

Improvement of Quality for Agricultural Products in the last Five Years (2007-2011)

N=12

Type of quality	Mean	Interpretation	Rank
Quality of caliber (size) of agricultural products	3.75	Adequate	1
Quality of customer attractiveness to agricultural crop production	3.56	Adequate	2
Quality of agricultural products' taste	3.43	Adequate	3
<b>Average</b>	<b>3.58</b>	Adequate	

**Source:** Primary data 2011

The agricultural production quality improvement has been adequate in terms of caliber/size with the mean of 3.75; customer attractiveness with the mean of 3.56 and

agricultural products' taste with the mean of 3.43, but still it has to be kept up to reach the very adequate level. By increasing customer attractiveness, quality of agricultural products' caliber and taste, the foreign market may be aware of Rwandan products and the weakness registered on the side of agricultural products export-table 5 (the industrial crops such as coffee and tea are not included) may be increased up to very adequate, becoming a strength in terms of quality of agricultural products.

### **Relationship between Extension Services and Crop Production among Farmers in Rwanda**

To determine the relationship between extension services and crop production among farmers in Rwanda, all results from level of effectiveness of extension services and level of agricultural crop production among farmers in Rwanda were computed using SPSS and correlations were found. The table 7 helped in statistical analysis of relationship between agricultural crop production and extension services. We have used R-value which is Pearson product-moment correlation index to measure the degree and direction of the relationship between crop production and extension services. The decision on null hypothesis was made basing on  $\alpha=0.05$  meaning that the threat of validity was 5 percent and therefore the population data were true at 95 percent.

**Table7**

Pearson's Correlation (Level of Significance: 0.05)

<b>Variable correlated</b>	<b>r-value</b>	<b>Sig.</b>	<b>Interpretation</b>	<b>Decision on Ho</b>
Agricultural Crop Production Vs Training Materials Access	0.553	0.000	Positive Significant	Rejected
Agricultural Crop Production Vs Training Methodology	-0.025	0.783	Negative not significant	Accepted
Agricultural Crop Production Vs Inputs Access	0.668	0.000	Positive Significant	Rejected
Agricultural Crop Production Vs Training Services	0.457	0.000	Positive Significant	Rejected
Improvement of quality of Agricultural Crop Production Vs Training Materials Access	0.139	0.131	Positive not Significant	Accepted
Improvement of quality of Agricultural Crop Production Vs Training Methodology	0.055	0.552	Positive not Significant	Accepted
Improvement of quality of Agricultural Crop Production Vs Inputs Access	0.304	0.001	Positive Significant	Rejected
Improvement of quality of Agricultural Crop Production Vs Training Services received	0.236	0.010	Positive Significant	Rejected

**Source:** Primary data, 2011

All variables are correlated positively apart from agriculture crop production and training methodology ( $r=-0.025$ ). The correlation is very low for some variables e.g improvement of quality of agricultural crop production and training methodology

( $r=0.055$ ); improvement of quality of agricultural crop production and training materials access ( $r=0.139$ ) and improvement of quality of agricultural crop production and training benefited from ( $r=0.236$ ). According to the table 7, in 3/8 cases, the null hypothesis was accepted, implying that there is no Significant relationship within Extension Services and Crop Production of Farmers in Rwanda. There is positive correlation between agricultural crop production and access to training materials meaning that they move in the same direction (one increases and the other follows or one decreases and the other takes the same direction). As a conclusion the null hypothesis is rejected ( $r=0.553$  & sig. =0.000) in favor of alternative hypothesis (H1).

Looking at agricultural crop production and training methodology, they are correlated negatively meaning that they move in opposite directions, and the difference is not significant meaning that the training methodology does not impact on agriculture production. These results do not corroborate results from previous studies ( Busogoro, 2009) whereby people trained using Farmer Field School approach have shown active participation and high adoption of what they have learned increasing their production.

The reason should be given to the fact that in the area of research the predominant method was training through cooperatives and very rarely farmers were informed of the other approach Farmer Field School. According to SIGH, A. K., 2008, the use of more than one method (written materials, Radio programs, meetings, demonstrations) carries the message effectively to the people and this is the *principle of adaptability*.

This has been proved through discussions with extension service agents at sector level, where they said that farmers were informed of the approach but so far demonstration plots were not established for public training purpose.

The access to inputs (seeds, agricultural loans, fertilizers, agricultural materials etc) and agricultural crop production are correlated positively and there is significant relationship between them, meaning that the null hypothesis was rejected. This

corroborates previous researchers' results. Daniel, B., 1984 says that fertilizer is the kingpin to increasing productivity in agriculture and according to him, for every tone of fertilizer nutrient put into the soil there is an increase of 8 to 10 tons of food grains, other things remaining equal and 70 percent of growth in agricultural production can be attributed to increased fertilizer use. Discussing with sector level extension services agents, we have come to know that farmers do not access agricultural inputs to satisfy their needs.

When farmers are trained in different areas of agricultural crop production (different crop production-beans, wheat, maize, banana, rice etc-), soil protection, soil fertilization and pest control there is an improvement of crop production and the hypothesis is rejected. This result corroborate results from Frank, 2001 who said that by extension services farmers knowledge and know-how increases and their production takes the same direction. Kelly et al, 2001 has also carried a research on farmers and they said that lack of knowledge was the principal reason for not using fertilizers to enhance productivity and the only way to provide farmers with agricultural knowledge is through different trainings.

Improvement of quality of Agricultural Crop Production and Training Materials Access are correlated positively but the correlation is very low ( $r=0.139$ ) and the null hypothesis is accepted meaning that there is no significant relationship within quality of agricultural crop production and access to training materials. On the other hand, no significant relationship within quality of agricultural crop production and training methodology and the positive correlation between them is very low ( $r=0.055$ ) meaning that even if they move in the same positive direction the speed is very low. According to results from the research, training methodology and training materials access do not have a link with quality of agricultural production.

There is significant relationship between the quality of Agricultural Crop Production and inputs access ( $< 0.05$ ) and they are positively correlated but the correlation is low ( $r=0.304$ ) and the null hypothesis was rejected. In other words, the

access to inputs has improved the quality of production and this appears realistic as the quality of agricultural crop production depends on the quality of seeds used and also fertilizers used that must be appropriate to the type of crop.

Between quality of Agricultural Crop Production and training services there is significant relationship ( $< 0.05$ ) and they are also correlated positively ( $r=0.236$ ) even if the correlation is not high. In fact, when farmers are trained on the production of any given crop, they learn how to increase the production in terms of quantity and quality by using quality seeds and appropriate fertilizers.



## **CHAPTER FIVE**

### **FINDINGS, CONCLUSIONS, RECOMMENDATIONS**

#### **Findings**

The study of different means from data collected according to different variables has shown some strengths and weaknesses in agricultural extension services in Rwanda and registered strength must be kept up while recorded weaknesses must be contained by use of appropriate strategies.

From the profile of farmers, we found out that most of those involved in agricultural crop production have completed primary education (60.8 percent); young people are also involved in agricultural crop production (30 percent) and old people start stepping out of agricultural crop production.

Farmers in Rwanda do not access extension services at the beginning of their involvement in agricultural crop production, whereby one may be involved in agricultural crop production for more than 40 years and has benefited from extension services for a half (20 years) that period only.

Looking at extension service Training Methodology, it has been proved that training of farmers in group/cooperatives was strength (3.18 as mean) but also still weak as achieved level was moderately adequate. Training farmers through farmer field schools (2.22 as mean) and through a combination of farmer field schools and group/cooperative (1.71 as mean) are gaps to be filled up. The extension service agents at sector level confirmed that this was a gap in their area of intervention.

For the extension service training materials access (modules or syllabuses), farmers have access to crop production materials e.g beans, wheat, banana, peas etc and the access level was moderately adequate with the mean of 2.88, far from being very adequate. Remarkable gaps were recorded in terms of access to soil fertilization materials with the mean of 2.27 and access to pest control materials with the mean of

1.89. Farmers are helped to access crop production materials to the level of moderately adequate but not supported to access soil protection and fertilization materials to cope with tons of soil lost with soil nutrients each year. Farmers also do not access pest control materials meaning that they are not informed of crop diseases and products to fight against them and may intervene in a wrong way causing pest resistance to pest control chemicals.

The research has shown that farmers have limited access to agricultural inputs. The strength in this area is the access to seeds (3.42 as mean) but little has been done as it has been achieved at moderately adequate level. Gaps in this area are the access to plowing machines (2.49 as mean); agricultural fertilizers e.g manure, chemical fertilizers (2.44 as mean) and in both cases the level of satisfaction is inadequate. The very worrying gap here is the access to agricultural loans e.g warrantage, loan (1.56 as mean) for inputs supply, loan for cottage industries etc and like we have seen it before agricultural activities cannot work alone without being linked to financing companies.

Most of trainings being delivered to farmers do not reach their very adequate level of satisfaction. What could be considered as strength needs to be improved from adequate to very adequate: area of crop rotation, use of organic fertilizers, agro forestry and cultivation of soil fixing plants. It has been noticed that in training farmers there is a need to stress on improved seeds use but challenges remain that no enough improved seeds available and even when they are available most farmers cannot afford them due to high prices on the market. Farmers are not very adequately trained on progressive and radical terraces (3.09 as means) and mulching (3.04 as mean) and both of them combined may solve the problem of soil and its fertility being washed away by water erosion. Having recorded inadequate level of satisfaction of farmers in terms of training on use of chemical fertilizers (1.95 as mean), there is a gap to restore soil fertility as organic fertilizers need to be complemented by chemical fertilizers to achieve production at very adequate level.

Farmers have achieved the increase of crop production at very adequate level (4.31 as mean) but a lot of work needs to be done to improve on the use of that production for family wellbeing and home market to increase income from agricultural production sales. All of them are achieved at adequate level and need to be kept up till the achievement of very adequate. There is also a remarkable gap in agricultural crop production storage (3.29 as mean) meaning that the increased production is being used seasonally. Nothing of the increased agricultural production is neither exported by farmers nor by entrepreneurs linked to farmers.

The quality of agricultural crop production (3.58 as average mean) has improved due to extension services and this has to be kept up.

Looking at the correlation table No 8, extension services such as access to training materials, access to inputs and access to training have impacted positively on the agricultural crop production. On the other hand, input access and training services received have positively impacted on quality of agricultural production. The three factors: access to inputs, access to training materials and access to trainings are very important to increase agricultural crop production in terms of quantity and quality.

Access to training materials has no impact on agricultural crop production (qualitative and quantitative production).

## **Conclusion**

All age categories of farmers are involved in agriculture and young people are also involved (30 percent) with few representatives of old people. Most farmers have completed primary education (60.8 percent) and few are illiterate (5.8 percent). Farmers who have done secondary education are also represented in agricultural crop production (33.3 percent)

Farmers in Rwanda do not access extension services at the beginning of their involvement in agricultural crop production.

Farmers are trained mainly in group/cooperatives and farmer field school approach is not used though it has proven high crop production among farmers benefiting from it in their farming activities.

Farmers do not access training materials (modules or syllabuses) at sufficient level. Remarkable gaps were recorded in terms of access to soil fertilization materials, access to pest control materials, soil protection and fertilization.

The research has shown that farmers have limited access to agricultural inputs in terms of access to plowing machines, agricultural fertilizers e.g manure, chemical fertilizers, access to agricultural loans e.g warrantage, loan for inputs supply, loan for cottage industries etc.

Most of trainings being delivered to farmers do not reach their very adequate level of satisfaction in the area of crop rotation, use of organic fertilizers, agro forestry and cultivation of soil fixing plants, progressive and radical terraces and mulching.

Farmers have achieved the increase of crop production at very adequate level but that production does not provide them with income through use of local and foreign markets and it is used seasonally as its storage was not very adequate.

The quality of agricultural crop production has improved due to extension services and this must be kept up.

The extension services such as access to training materials, access to inputs and access to training have impacted positively on the agricultural crop production.

Input access and training services received have positively impacted on quality of agricultural production.

Access to training materials has not shown impact on agricultural crop production (qualitative and quantitative production).

## **Recommendations**

According to the results of the research, our recommendations go to all people intervening in the domain of agricultural extension services in order to solve the problem of ineffectiveness of agricultural extension services amongst farmers.

Government Officials, extension service providers should facilitate farmers to access extension services in their early age of agricultural activities.

Extension service providers (public and private) must introduce the training of farmers using farmer field school (FFS) approach;

Extension service providers (public and private) must make it possible to farmers to learn through group/cooperative and practice in demonstration plots;

Extension service providers (public and private) must make it possible to farmers to access soil protection training materials;

Extension service providers (public and private) should help farmers to access soil fertilization training materials;

Extension service providers (public and private) must help farmers to access pest control training materials;

Government especially the Ministry of Agriculture and Animal Husbandry must help farmers to access agricultural tools e.g plowing machines;

Extension service providers (public and private) must support farmers to access manure and chemical fertilizers;

The Government of Rwanda must develop and regulate the loan strategy in agriculture domain and facilitate farmers to access to it;

Extension service providers (public and private) must train farmers on the use of improved seeds to increase their use by all farmers;

Extension service providers (public and private) must train farmers on progressive and radical terraces;

Extension service providers (public and private) must create farmers awareness on mulching as a solution to the problem of water evaporation and soil fertility;

Farmers must be trained on chemical fertilizers use to complement the use of manure;

Extension service providers (public and private) must help farmers to increase manure use by composting to solve the problem of lack of animals among farmers;

Extension service providers (public and private) must train farmers on agriculture production oriented to the market needs;

Extension service providers (public and private) must assist farmers to access storages for crop production for future use;

Extension service providers (public and private) must assist farmers to orient their agricultural production towards export;

Extension service providers (public and private) need to help farmers to segment their market playing on caliber, customer attractiveness and taste according to market needs;

To avoid waste of time in designing training curricula, extension service providers should act as intermediaries linking farmers to '*Inades Formation*' and *PASNVA* who have worked on agricultural extension curricula.

### **Recommendation for further research**

Effect of Extension Services on Agricultural Crop Production in the area where FFS approach is developed;

The Effects of Extension Service Agents on Agricultural Crop Production;

The Extension Services Follow Up and Agricultural Crop Production.

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## APPENDICES

### APPENDIX I: TRANSMITTAL LETTER



**KAMPALA  
INTERNATIONAL  
UNIVERSITY**

Ggaba Road - Kansanga  
P.O. Box 20000, Kampala, Uganda  
Tel: +256- 41- 266013 / +256- 41-267634  
Fax: +256- 41- 501974  
E- mail: admin@kiu.ac.ug,  
Website: www.kiu.ac.ug

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**OFFICE OF THE COORDINATOR, BUSINESS AND  
MANAGEMENT - SCHOOL OF POSTGRADUATE STUDIES AND RESEARCH**

13<sup>th</sup> Sept. 2010

Dear Sir/Madam,

**RE: REQUEST FOR SEBAGENZI PROSPER, REG. NO. MBA/10026/81/DE  
TO CONDUCT RESEARCH IN YOUR INSTITUTION.**

The above mentioned is a bonafide student of Kampala International University pursuing a Masters of Business Administration (Management Option).

He is currently conducting a field research the title of which is "The Effect of Extension Services on Agricultural Crop Production in Gicumbi District of Northern Province of Rwanda". As part of his research work he has to collect relevant information through questionnaires, interviews and other relevant reading materials.

Your institution has been identified as a valuable source of information pertaining to his research project. The purpose of this letter is to request you to avail him with the pertinent information he may need.

Any information shared with him will be used for academic purposes only and we promise to share our findings with your institution. Rest assured the data you provide shall be kept with utmost confidentiality.

Any assistance rendered to him will be highly appreciated.

Yours truly,

  
Mr. Ssemugenyi Fred  
Coordinator

**In-service and Distance Learning – School of Postgraduate Studies and Research**



## APPENDIX II: LETTER OF AUTHORIZATION TO CARRY OUT RESEARCH

REPUBLIC OF RWANDA



Northern Province  
GICUMBI District  
Po.Box: 22 BYUMBA  
E-mail : [gicumbidistrict@minaloc.gov.rw](mailto:gicumbidistrict@minaloc.gov.rw)

*Gicumbi 18/09/2020  
N° 787/07-OR-20/0-20*

To Mr. SEBAGENZI PROSPER

Re: TO CONDUCT A RESEARCH

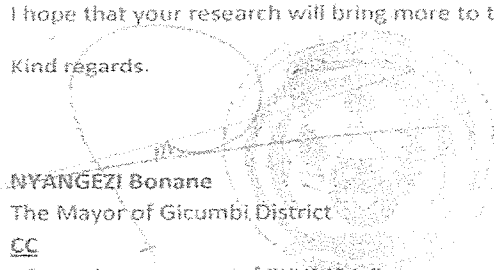
Dear Sir,

Reference to letter from the Office of the Coordinator in Business and Management, School of Post Graduate Studies and Research of 13<sup>th</sup> September 2001, KAMPALA International University,

I would like to inform you that you are admitted to conduct your research in Gicumbi District especially in BYUMBA, NYANKENKE, MIYOVE, RUKOMO, KANIGA, CYUMBA, and RUKOMO Sectors.

I hope that your research will bring more to the quick development of Gicumbi District.

Kind regards.

  
NYANGEZI Bonane  
The Mayor of Gicumbi District

CC

- Executive secretary of BYUMBA Sector
- Executive secretary of NYANKENKE Sector
- Executive secretary of MIYOVE Sector
- Executive secretary of RUKOMO Sector
- Executive secretary of CYUMBA Sector
- Executive secretary of KANIGA Sector

## APPENDIX III: RESEARCH INSTRUMENT – QUESTIONNAIRE

KAMPALA INTERNATIONAL UNIVERSITY

IODL

MBA, 2011

### QUESTIONNAIRE

#### ***Confidentiality***

*This questionnaire serves only as a tool for collecting information to be used in the Prosper Sebagenzi thesis and cannot be used or communicated for other purposes outside education. The identity of farmers contacted will not be revealed.*

*For contact:*

*Sebagenzi Prosper;*

*Mobile phone: +250788760662*

*E-mail: sebazenziprosper@yahoo.fr*

#### FARMER IDENTIFICATION

District :.....

Sector :.....

Cell :.....

### A. Profile of Farmers

i. Respondent birth date (year):

ii. Respondent gender: Male  Female

iii. Level of education

*(P1-6: Different levels in Primary education; S1-6: Different levels in Secondary*

<b>i. Did not study</b> →						
<b>ii. Primary education</b> →	<b>P1</b>	<b>P2</b>	<b>P3</b>	<b>P4</b>	<b>P5</b>	<b>P6</b>
	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>S4</b>	<b>S5</b>	<b>S6</b>
<b>iii. Secondary education</b> →						

iv. How long have you been in agricultural crop production?

1. 1-10
2. 11-20
3. 21-30
4. 31-40
5. 41 & Above

v. How long have you been benefiting from extension services?

1. 1-10
2. 11-20
3. 21 & Above

## B. Level of Effectiveness of Extension Services

**Directions:** All the following questions will be responded to using levels as below:

**1:** Very inadequate    **2:** Inadequate    **3:** Medium    **4:** Moderately Adequate    **5:** Very inadequate

### 1. Indicate the level of satisfaction in the following:

i. Training through group/cooperatives	→	1	2	3	4	5
ii. Training through farmer field schools	→	1	2	3	4	5
iii. Training through both above methods	→	1	2	3	4	5

### 2. Indicate the Extent to which you Access the Following Extension Service Materials:

i. Crop Production materials	→	1	2	3	4	5
ii. Soil protection materials	→	1	2	3	4	5
iii. Soil fertilization materials	→	1	2	3	4	5
iv. Pest control materials	→	1	2	3	4	5

### 3. Indicate the Extent to which you Access the Following Extension Service Inputs:

iv. Agricultural seeds (eg. Beans)	→	1	2	3	4	5
v. Agricultural fertilizers (eg. Manure)	→	1	2	3	4	5
vi. Agricultural loans (eg. Warrantage)	→	1	2	3	4	5
vii. Agricultural tools (eg. Plowing machine)	→	1	2	3	4	5

**2. Indicate the Extent to which you Receive(ed) Training Services on Each of the Following Techniques:**

i. Progressive and radical terraces	→	1	2	3	4	5
ii. Cultivation of soil fixing plants	→	1	2	3	4	5
iii. Mulching	→	1	2	3	4	5
iv. Agro forestry	→	1	2	3	4	5
v. Use of improved seeds	→	1	2	3	4	5
vi. Use of chemical fertilizers	→	1	2	3	4	5
vii. Use of organic fertilizers	→	1	2	3	4	5
viii. Crop rotation	→	1	2	3	4	5

**C. LEVEL OF CROP PRODUCTION AMONG FARMERS**

**1. Indicate the Extent to which there has been an Increase in your Agricultural Crop Production in the last Five Years (2007-2011) in Terms of the Following:**

i. General agriculture crop production	→	1	2	3	4	5
ii. Production for sales (Home Market)	→	1	2	3	4	5
iii. Production for home use	→	1	2	3	4	5
iv. Production for store	→	1	2	3	4	5
v. Production for export	→	1	2	3	4	5
vi. Income from sales of agricultural products	→	1	2	3	4	5



**2. Indicate the Extent to which the Quality of your Agricultural Production has improved in the last Five Years (2007-2011) in Terms of the Following Aspects:**

i. Caliber (size) of agriculture products	—————→	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
ii. Taste of agricultural production	—————→	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
iii. Customer Attractiveness	—————→	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## **APPENDIX IV: RESEARCHER'S CURRICULUM VITAE**

### **Personal Profile**

I am SEBAGENZI Prosper, born in Muhanga District of Southern Province of Rwanda on March 5<sup>th</sup> 1971 of NYIRANDATWA Catherine and TURIKUNKIKO Athanase, married to MUJAWAMAHORO Béatrice, father of 2 daughters and one son: GIHOZO Aimée Sandrine, IZERE Aimée Dorine and INEZA Aimé Brian.

### **Educational Background**

I am candidate to the Master's of Business Administration from Kampala International University (KIU) and I am Bachelor's Degree holder in Agriculture since 2001 from the University of Rwanda, a degree I obtained after writing and defending the Memoire entitled " *Etude de l'Influence de la race, de l'alimentation et du système d'élevage sur l'engraissement des lapereaux*"

I completed the secondary school in Biology and Chemistry from Scientific School of Byimana in 1992 and the Primary education was done at BUDENDE Primary School since 1978 to 1986.

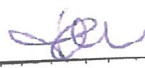



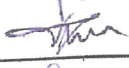

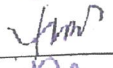
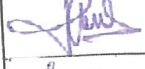



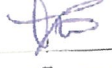
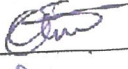
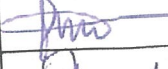


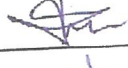
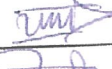
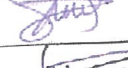

### **Work Experience**

I am working as Monitoring and Evaluation Officer of Caritas Rwanda since April, 2010 to date, under its project USAID HIGA UBEHO, a USAID and PEPFAR funded project, implemented by 17 Rwanda Partner Organizations (RPOs). Monitored activities are food security, nutrition and economic strengthening of project beneficiaries.

Since 2004 to 2010 I was working for World Vision Rwanda as Farmer's Association Facilitator under its USAID funded projects namely Development Activities Program (DAP) and IBYIRINGIRO where main activity was to help Cooperatives to increase their





















# APPENDIX V1

WE, MEMBERS OF ICYEREKEZO COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST, AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR STURDIES PURPOSE ONLY

No	Names	Sector	Cooperative	Gender	Signature
1	NYAMUGABO Thacienne	RUKOMO	ICYEREKEZO	F	
2	HABUMUGISHA Cyprien	RUKOMO	ICYEREKEZO	M	
3	RIBERAKURORA Innocent	RUKOMO	ICYEREKEZO	M	
4	MUKAMFIZI Xaverine	RUKOMO	ICYEREKEZO	F	
5	TULIKUNKIKO Claver	RUKOMO	ICYEREKEZO	M	
6	MUKAKANYANGE Patrice	RUKOMO	ICYEREKEZO	F	
7	MUKAMURENZI Vestine	RUKOMO	ICYEREKEZO	F	
8	MUKANDEMEZO Seraphine	RUKOMO	ICYEREKEZO	F	
9	NIKUZE Beline	RUKOMO	ICYEREKEZO	F	
10	MUSASANGOHE Valerie	RUKOMO	ICYEREKEZO	F	
11	MUREKEYISONI Odille	RUKOMO	ICYEREKEZO	F	
12	RUTAGENGWA Joseph	RUKOMO	ICYEREKEZO	M	
13	Kalinda Claude	RUKOMO	ICYEREKEZO	M	
14	MURAMIRA Didace	RUKOMO	ICYEREKEZO	M	
15	NSANZABAHIZI Nepomuscene	RUKOMO	ICYEREKEZO	M	
16	MUKAKAREGA Genereuse	RUKOMO	ICYEREKEZO	F	
17	KAREGA Emmanuel	RUKOMO	ICYEREKEZO	M	
18	MUKAGASANA Veneranda	RUKOMO	ICYEREKEZO	F	
19	KABANDA Phocas	RUKOMO	ICYEREKEZO	M	
20	GAKWIYE Jean	RUKOMO	ICYEREKEZO	M	



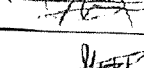




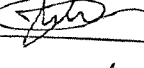
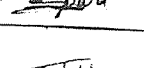
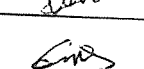
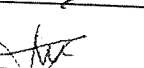

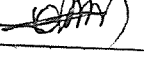


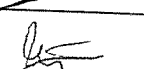
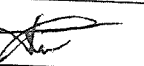



## APPENDIX V2

**WE, MEMBERS OF IMPUYAKI COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST,  
AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR  
STURDIES PURPOSE ONLY**

No	Names	Sector	Cooperative	Gender	Signature
1	TUMUHIMBISE Verene	KANIGA	IMPUYAKI	F	
2	MUNYANEZA Emmanuel	KANIGA	IMPUYAKI	M	
3	NSENGIYUMVA J Damascene	KANIGA	IMPUYAKI	M	
4	NSABUWERA Emmaus	KANIGA	IMPUYAKI	M	
5	TIRWAKUNDA Jean Bernard	KANIGA	IMPUYAKI	M	
6	BANDIHEHI Felicien	KANIGA	IMPUYAKI	M	
7	BAMWEBEHIRE Adeline	KANIGA	IMPUYAKI	F	
8	MICOMBERO Vedaste	KANIGA	IMPUYAKI	M	
9	UZAYISENGA Beatrice	KANIGA	IMPUYAKI	F	
10	MUKAMUGANGA Epiphanie	KANIGA	IMPUYAKI	F	
11	RUKIRABARAME Eric	KANIGA	IMPUYAKI	M	
12	NIWEBYONA Media	KANIGA	IMPUYAKI	F	
13	MUJAWABERA Florence	KANIGA	IMPUYAKI	F	
14	HATANGIMANA Patrice	KANIGA	IMPUYAKI	M	
15	NIRERE Georgine	KANIGA	IMPUYAKI	F	
16	ECYESIMIRE Jeannine	KANIGA	IMPUYAKI	F	
17	MKANDAMAGE Madeleine	KANIGA	IMPUYAKI	F	
18	HAKURINKA Beatrice	KANIGA	IMPUYAKI	F	
19	AHIMANA Anastase	KANIGA	IMPUYAKI	M	
20	NGIZWENAYO Ildephonse	KANIGA	IMPUYAKI	M	


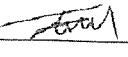
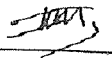


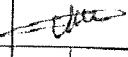
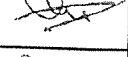
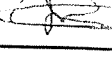


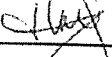



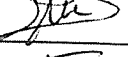


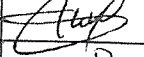


### APPENDIX V3

**WE, MEMBERS OF RWANYUBUKENE COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST, AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR STURDIES PURPOSE ONLY**

No	Names	Sector	Cooperative	Gender	Signature
1	MUKAMABANO Aulerie	NYANKENKE	RWANYUBUKENE	F	
2	UWAYEZU Elisabeth	NYANKENKE	RWANYUBUKENE	F	
3	NTIBEND Jean	NYANKENKE	RWANYUBUKENE	M	
4	MUKAKALISA Jeannette	NYANKENKE	RWANYUBUKENE	F	
5	NYIRAROMBA Floride	NYANKENKE	RWANYUBUKENE	F	
6	BYIGERO Augustin	NYANKENKE	RWANYUBUKENE	M	
7	MUKAGASHUMBA Marie Louise	NYANKENKE	RWANYUBUKENE	F	
8	UZAMUKUNDA Virginie	NYANKENKE	RWANYUBUKENE	F	
9	MUKAKARENZI Vestine	NYANKENKE	RWANYUBUKENE	F	
10	HARERIMANA Theoneste	NYANKENKE	RWANYUBUKENE	M	
11	NYIRAMBARUSHIMANA Vestine	NYANKENKE	RWANYUBUKENE	F	
12	RWIRIRIZA Edouard	NYANKENKE	RWANYUBUKENE	M	
13	BIZUMUREMYI Antoine	NYANKENKE	RWANYUBUKENE	M	
14	NIYONSHUTI Emmanuel	NYANKENKE	RWANYUBUKENE	M	
15	NGENDAHAYO JMV	NYANKENKE	RWANYUBUKENE	M	
16	MINANI Ildephonse	NYANKENKE	RWANYUBUKENE	M	
17	MUKAKABERA Judith	NYANKENKE	RWANYUBUKENE	F	
18	HAVUGIMANA Félicien	NYANKENKE	RWANYUBUKENE	M	
19	MUKAKAREGA Marthe	NYANKENKE	RWANYUBUKENE	F	
20	MWONGEREZA Didace	NYANKENKE	RWANYUBUKENE	M	

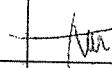
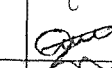
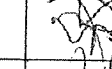
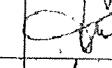
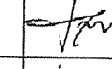

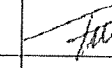








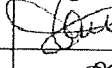

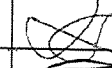


# APPENDIX V4

**WE, MEMBERS OF KUNDISUKA COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST, AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR STURDIES PURPOSE ONLY**

No	Names	Sector	Cooperative	Gender	Signature
1	NZABONIMANA Leodomir	MIYOVE	KUNDISUKA	M	
2	NKUNDIMFURA John	MIYOVE	KUNDISUKA	M	
3	MBIKENAYO	MIYOVE	KUNDISUKA	M	
4	NIYITEGEKA Diogene	MIYOVE	KUNDISUKA	M	
5	RUHUMURIZA Ephrem	MIYOVE	KUNDISUKA	M	
6	MUGABARIGIRA Felicien	MIYOVE	KUNDISUKA	M	
7	BIHIRABAKE	MIYOVE	KUNDISUKA	M	
8	HABIYAKARE	MIYOVE	KUNDISUKA	M	
9	NYIRARUVUGO	MIYOVE	KUNDISUKA	F	
10	MUKANDAMAGE	MIYOVE	KUNDISUKA	F	
11	MUSABYEMUZI	MIYOVE	KUNDISUKA	F	
12	MUTUYIMANA	MIYOVE	KUNDISUKA	F	
13	NYIRAKAGESA	MIYOVE	KUNDISUKA	F	
14	NYIRANGERAGEZE	MIYOVE	KUNDISUKA	F	
15	MUKANDAYISENGA Vestine	MIYOVE	KUNDISUKA	F	
16	NYIRABAGENI	MIYOVE	KUNDISUKA	F	
17	KANZAYIRE Béatrice	MIYOVE	KUNDISUKA	F	
18	NIRERE Innocent	MIYOVE	KUNDISUKA	M	
19	ABIMANA Donata	MIYOVE	KUNDISUKA	F	
20	MUNYAKAZI Emmanuel	MIYOVE	KUNDISUKA	M	




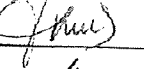
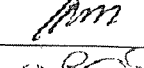

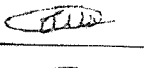



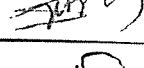

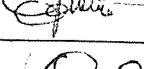

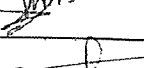
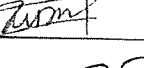


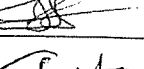
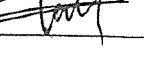
# APPENDIX V5

WE, MEMBERS OF DUFITUBUSHAKE COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST, AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR STURDIES PURPOSE ONLY

No	Names	Sector	Cooperative	Gender	Signature
1	NIRAGIRE Regine	CYUMBA	DUFITUBUSHAKE	F	
2	NYABANIKA Euphrasie	CYUMBA	DUFITUBUSHAKE	F	
3	NDEKEZI Telesphore	CYUMBA	DUFITUBUSHAKE	M	
4	SEMANA Alfred	CYUMBA	DUFITUBUSHAKE	M	
5	NDACHEBIRE Xaverine	CYUMBA	DUFITUBUSHAKE	F	
6	NKURIYINGOMA Emmanuel	CYUMBA	DUFITUBUSHAKE	M	
7	NEMEYIMANA Jean Paul	CYUMBA	DUFITUBUSHAKE	M	
8	NTAHOMPAGAZE Michel	CYUMBA	DUFITUBUSHAKE	M	
9	MUGENZI Pascal	CYUMBA	DUFITUBUSHAKE	M	
10	UWIZEYIMANA Elisabeth	CYUMBA	DUFITUBUSHAKE	F	
11	MUKANDARE Adele	CYUMBA	DUFITUBUSHAKE	F	
12	HABUWITONZE Protogene	CYUMBA	DUFITUBUSHAKE	M.	
13	MUKANGAMIJE Theopiste	CYUMBA	DUFITUBUSHAKE	F	
14	MUKANYANDEKWE Esperance	CYUMBA	DUFITUBUSHAKE	F	
15	MUKARUSANGWA Marie Beatha	CYUMBA	DUFITUBUSHAKE	F	
16	KARENZI Timotee	CYUMBA	DUFITUBUSHAKE	M	
17	MUKAMURENZI Félicité	CYUMBA	DUFITUBUSHAKE	F	
18	KAYUMBA Vincent	CYUMBA	DUFITUBUSHAKE	M	
19	MUKANGANGO Drocelle	CYUMBA	DUFITUBUSHAKE	F	
20	NYAMINANI Alphonse	CYUMBA	DUFITUBUSHAKE	M	

# APPENDIX V6


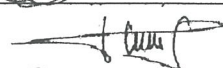
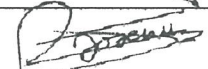
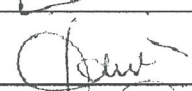


WE, MEMBERS OF KOJYAKI COOPERATIVE, BY SIGNING THIS ATTENDANCE LIST,  
AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR  
STURDIES PURPOSE ONLY

No	Names	Sector	Cooperative	Gender	Signature
1	MPAKANIYE Theodore	BYUMBA	KOJYAKI	M	
2	KAGINA Ildephonse		KOJYAKI	M	
3	HAKIZIMANA Jean Claude	BYUMBA	KOJYAKI	M	
4	MUKARUNYANA Seraphine	BYUMBA	KOJYAKI	F	
5	TUYISENGE Viateur	BYUMBA	KOJYAKI	M	
6	MUKARUBIBI Laurence	BYUMBA	KOJYAKI	F	
7	BAHUFITE Claudien	BYUMBA	KOJYAKI	M	
8	NYIRANGERAGEZE Rosalie	BYUMBA	KOJYAKI	F	
9	MUKANTABANA Asterie	BYUMBA	KOJYAKI	F	
10	UWIMANA Fabien	BYUMBA	KOJYAKI	M	
11	NYIRAMANA Elisabeth	BYUMBA	KOJYAKI	F	
12	NYIRABIZIMANA Venentie	BYUMBA	KOJYAKI	F	
13	NTAMPAKA Xavier	BYUMBA	KOJYAKI	M	
14	YANKURIJE Anne Marie	BYUMBA	KOJYAKI	F	
15	NSENGIYUMVA Ildephonse	BYUMBA	KOJYAKI	M	
16	NSABIMANA Virgie	BYUMBA	KOJYAKI	F	
17	BIHOYIKI Jean Damascene	BYUMBA	KOJYAKI	M	
18	KAMASA Felicien	BYUMBA	KOJYAKI	M	
19	BIHOYIKI Chantal	BYUMBA	KOJYAKI	F	
20	UWIZEYIMANA	BYUMBA	KOJYAKI	F	



### APPENDIX V3

**WE, MEMBERS EXTENSION SERVICE AGENTS AT SECTOR LEVEL, BY SIGNING THIS ATTENDANCE LIST, AGREE TO PROVIDE MR. PROSPER SEBAGENZI WITH INFORMATION HE NEEDS FOR STURDIES PURPOSE ONLY**

No	Names	Sector	Signature
1	Esperence	NYANKENKE	
2	Chrysostome	MIYOVE	
3	Joseph	KANIGA	
4	Anastase	RUKOMO	
5	Gustave	CYUMBA	
6	Alphonsine	BYUMBA	



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